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EXAMINER	
PADGETT, MARIANNE L	
ART UNIT	**PAPER NUMBER**
1792	

NOTIFICATION DATE	DELIVERY MODE
01/24/2008	ELECTRONIC

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Notice of the Office communication was sent electronically on above-indicated "Notification Date" to the following e-mail address(es):

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Office Action Summary	Application No.	Applicant(s)	
	10/709,302	LIN ET AL.	
	Examiner	Art Unit	
	Marianne L. Padgett	1792	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *11/5/2007, 9/19/2005 & 4/27/2004*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-10* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-10* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date *9/19/5*.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

1. Applicant's election without traverse of group I, method claims 1-10 in the reply filed on 11/5/2007 is acknowledged.

The examiner further notes that nonelected product claim 11 has been canceled.

2. Claims 1-10 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

In independent claim 1, in the last 2 line, while it is clear that the limitation "during deposition... said ion source **continues** to bombard said flat main surface" (emphasis added) requires the ion beam bombardment & deposition from the evaporation source to be simultaneous, the phrasing implies, but does not positively necessitate, the ion bombardment was commenced before evaporation started, hence it is uncertain whether or not this phrasing is intended to require initial ion bombardment before deposition or not. For purposes of examination either option will be considered to read all the process. Note that merely listing the ion bombardment requirement before listing the vapor deposition limitation, does not necessitate a sequence of performing the steps, as clear temporal or antecedent limitations do not require a sequence in the claim as written.

Also in claim 1, the phrasing "deposit on to flat main surface substantially along said line normal to said flat main surface" is somewhat cryptic & ambiguous in that it could be merely referring to an orientation of the deposit to be normal to the surface over the entire "flat main surface", however the literal meaning given that the limitation is referencing a particular **single line** normal to the surface, **not** a general orientation of normal to the flat surface (which would refer to any part of the flat surface), would be deposition where that single line intersects the flat surface, instead of generally over the entire flat main surface. Note that given a **flat** surface as claimed, there is only one orientation that is normal to that surface, it would be acceptable to claim -- deposit... substantially normal to said flat main surface --,

which would clearly read on the first option suggested above & be consistent with the preceding claim limitations.

With respect to claims 3 & 7, it is noted that while these claims recite a means by which the alignment force or the pre-tilt of the alignment layer may be changed, they are not a positive recitation or requirement that any such change, adjustment, optimization etc., is ever performed, such that it is unclear if the recited alterings are intended to be required or not & these claims as written do not provide a clear further limitation of the independent claims.

Claims 3 & 7 are objected to under 37 CFR 1.75(c), as being of improper dependent form for failing to further limit the subject matter of a previous claim. Applicant is required to cancel the claim(s), or amend the claim(s) to place the claim(s) in proper dependent form, or rewrite the claim(s) in independent form. See immediately above.

In claims 5 & 6, specific ion currents & ion voltages are recited, but it is unclear when, if ever, they are employed, i.e. are these values relevant to before or after the ion beam is adjusted as recited in claim 4, from which these claims depend. While the examiner might assume that the "ion beam is adjusted" as preparation for treatment of the substrate (the most logical time), this is not necessitated by the claimed limitations.

In claim 9, the limitation of "SiOx" is objected to as the chemical formula is improperly written, as the variable "x" should be subscripted, and is rejected as being indefinite, since the variable is not defined, thus is of uncertain scope. The examiner notes the use of this term in paragraph [0014], but did not find any definition for the variable in the specification, however as this term encompasses -- silicon oxide -- in general, the examiner generally finds use of the generic term of silicon oxide an acceptable substitute for this chemical formula when its variable cannot be appropriately defined from the specification.

3. Applicants' IDS is made record & it is noted that the Japanese reference to Shigeta Masanobu et al. is performing a process of forming alignment layers, that is substantially similar to the claims of applicants, involving simultaneous evaporation of silicon dioxide while bombarding with an ion beam & rotating substrates, however from figure 1 it cannot be determined if either of the evaporation source or the ion gun are oriented normal to the substrate surfaces, which are on the curved substrate holder, however figure 3 appears to be discussing the orientation of the evaporation source deposition material as being at angle θ to the normal of at least one individual substrate, however since only the abstract is in English & does not discuss this figure, this is not certain.

4. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

5. Claims 1, 3-4 & 7-8 are rejected under 35 U.S.C. 102(b) as being anticipated by Nagasaka et al. (2002/0017235 A1).

Nagasaka et al. (235) teach a process for depositing a coating (titanium nitride) having a preferentially ordered crystal structure, that employs an evaporation source opposite of the substrate (i.e. deposits evaporant normal to the substrate surface), which is on a holder that is rotated in order to uniformly formed the film on the substrate surface. An ion beam is irradiated to the substrate surface during the vapor deposition, where the ion beam is angled obliquely to the surface & where the irradiation conditions of the nitrogen ion beam are used to control the orientation of the crystal particles of the deposited film by controlling parameters, such as the acceleration voltage of the ion, the current density, the energy of the applied ion & the irradiation angle. Exemplary angles include 45°, while preferred acceleration voltages are 1-40 kV, with an example of 10 kV & an ion current density example of 2.0 amps/m^2. Particularly see the abstract; figure 1; [0014]; [0017]; [0042]; [0045]; & [0070-77].

The examiner notes, that in applicants' claims, the adjectives of "non-rubbing alignment" modifying "layer" express and intended use which is not actually required to be performed, such that a reasonable interpretation of this claim language as broadly written, would include formation of any layer that is **capable** of affecting the alignment or orientation of a subsequently applied layer, thus any layer which has a preferential crystal orientation that is produced by techniques that is not rubbing, may be considered to meet the criteria of the "non-rubbing alignment layer" as presently set forth in these claims.

6. Claims 5 & 10 are rejected under 35 U.S.C. 103(a) as being unpatentable over Nagasaka et al. (235).

While Nagasaka et al. (235) do not teach any particular ion currents, but instead teach ion current densities, the density is a more useful parameter as it is not depended on the particular apparatus & size of substrate area being treated, while to get the same effect in apparatus of different dimensions one would employ different ion currents depending on those dimensions & surface areas treated at one instance.

Therefore, it would've been obvious to one of ordinary skill in the art to employ routine experimentation to determine the particular ion current required for a particular apparatus, as well as the particular ion current density based on the teachings of Nagasaka et al. (235), who specifically teach control, i.e. optimization, of the crystal orientation by control of this parameter, among others.

With respect to rotation speed, while Nagasaka et al. (235) teach rotating the substrate in order to effect uniformly coating, no discussion of rotation speeds was found in the reference by the examiner, however given the suggestion of the desired effect of this action, it would've been obvious to one of ordinary skill in the art to determine such parameters as rotation speed that would enable one to produce the taught desired effect, where the speed would have been expected to be fast enough to even out differences caused by the evaporation configuration & sources, but slow enough not to put stresses on the depositing film that would be detrimental, thus would reasonably have been expected to include values below the maximum claimed value of 12 rpm.

7. Claims 1-10 are rejected under 35 U.S.C. 103(a) as being unpatentable over Andry et al. (6,660,341 B2) & (6,724,449 B1), in view of Nagasaka et al. (235) or Shigeta et al. (JP 11-160711).

The Andry et al. references, both teach processes performing alignment layers for liquid crystal devices that may be homeotropic silicon oxide alignment layers, deposited using dry deposition techniques & ion beams. Particularly, Andry et al. (341) teach that their process solves problems found in oblique vapor deposition processes, may be employed to tune (i.e. optimize) the pre-tilt angle of the alignment layer, teaching that a plurality of different dry deposition processing techniques may be employed (CVD, sputtering, etc.) in combination with ion beam treatment, which eliminates the need for rubbing treatment. Andry et al. (341) specifically teach that the ion beam treatment may be employed **during** or after the deposition of the film. In Andry et al. (341), see the abstract; col. 2, lines 27-62; col. 3, lines 28-37 & 53-55; col. 4, lines 10-63, especially 15-18, 22-31 & 42-50; col. 5, lines 453, especially 22-28 for silicon oxide is, 32-36 for different deposition techniques & 39-41 for performing the ion

bombardment simultaneous with formation of the layer, with succeeding discussion of the ion beam providing unidirectional & control full pretilt; col. 6, lines 13-23; & claims. Andry et al. (341) differ by not explicitly providing an example of a vapor deposition dry processing technique, which deposits normal to a flat substrate surface & lacks discussion of rotating substrate.

Andry et al. (449) teach variety of dry deposition techniques, which may be employed to achieve vertical alignments or tilted homeotropic alignment layers, specifically exemplifying vapor deposition techniques for silicon dioxide used therefore inclusive of e-beam evaporation & RF sputtering, where the deposition techniques do not require an oblique angle, instead may be performed normal to the substrate, however differ by only discussing their ion beam treatment as a post-treatment for affecting the alignment. In Andry et al. (449), particularly see the abstract; col. 2, lines 21-50; col. 4, lines 1-11 & 21-30; col. 5, lines 41-58; col. 6, lines 3-23, especially 13-19; and claims 8-9 & 11. Andry et al. (449) also has no discussion of rotation during deposition. It would've been obvious to one of ordinary skill in the art given these analogous & highly overlapping teachings of Andry et al. (341) & (449), that the particular dry processing techniques of Andry et al. (449) would have been expected to be effective for the more generally presented dry processing techniques of (341), including when simultaneously ion beam treated, with the expectation of being able to equivalently deposit the alignment layers, such as the tilted homeotropic alignment layers of silicon oxides taught in both references. Alternately, the teachings of Andry et al. (341), which simultaneous or sequential ion beam treatment may be employed with the dry processing techniques, would have been expected to be equivalently applicable to the (449) teachings that only discuss the post-treatment with ion beams, in order to effect the same control of pretilt angles, as the (341) teachings suggest that equivalent effects may be provided by simultaneous ion beam & deposition.

Nagasaka et al. (235) was discussed above in sections 5-6, and is directed to a deposition process that is analogous, in that it is also concerning vapor deposition with simultaneous ion beam treatment in order to effect the microstructure or orientation of the deposited film. Nagasaka et al. provides the

advantage of rotating the substrate in order to effect uniformed deposition upon that substrate, where that rotation does not hinder achieving desired oriented effects in the film being deposited, therefore it would've been obvious to one of ordinary skill in the art to employ rotation of substrates during dry deposition as taught in the Andry et al. references in order to achieve uniformed deposition across the entirety of the substrate surface being coated, as such would have been expected to be equally advantageous therein, since this alignment layers are expected to be employed in a liquid crystal cell which would benefit from the uniformed deposition.

Alternately, Shigeta et al. (JP), who as shown in their figures 1-3 & English abstract, is also teaching alignment layers of silicon dioxide formed via a vapor deposition simultaneously with ion beam irradiation, with rotation of the substrate occurring during alignment layer formation, however where it appears that both the evaporant & the ion beam are obliquely applied, thus differ from the claimed process. Therefore, it would've been obvious to one of ordinary skill in the art to employ rotation of the substrate holder, thus substrates being coated with alignment layers in the above combination of the Andry et al. references, as rotation is shown to be effectively employed in depositing analogous alignment layers in combined vapor deposition & ion beam processing, thus would have been expected by one of ordinary skill in the art to be effective in the primary references' techniques & desirable for the reasons that rotation of substrate holders are conventionally employed, i.e. to equally deposit on different surface areas being coated. Note optimization the routine experimentation of rotation speed depended on particular apparatus & substrate configurations would have been obvious for reasons as discussed above.

8. Other art of interest includes: Nagasaka et al. (6,767,657 B1) & Brandolf (4,485,759), who provide further teachings concerning the use of rotating a substrate for processes of vapor deposition & ion beam treatment; Shigeta et al. (5,268,781), who provide teaching similar to the Japanese Shigeta reference, but appear to lack discussion of substrate rotation, as well as Fijol (2002/0135731 A1) with analogous teachings of oblique deposition combined with oblique ion beam treatment; Callegari et al.

(6,061,114 & 2002/0063830 A1), plus Shimada et al. (5,030,322) have vapor deposition, then ion beam treatments for alignment layers, but only relate to sequential processing & lack discussion of rotation; Kitabatake et al. (4,844,785), Groves et al. (6,899,928 B1), Selvamanickam et al. (2005/0249869 A1; not prior art) and Ueno et al. (JP 63-282199, with English translation) teach a vapor deposition, with simultaneous ion beam assistance at angles & orientations claimed, but do not discuss rotation of substrate, nor use with liquid crystals; and Ota et al. (2005/0084624 A1) & Youn et al. (2004/0263737 A1), who are not prior art, have relevant teachings concerning alignment layers.

9. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Marianne L. Padgett whose telephone number is (571) 272-1425. The examiner can normally be reached on M-F from about 8:30 a.m. to 4:30 p.m.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Timothy Meeks, can be reached at (571) 272-1423. The fax phone number for the organization where this application or proceeding is assigned is (571) 273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

MLP/dictation software

1/16-18/2008

MARIANNE PADGETT
PRIMARY EXAMINER